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Makkonen, Pekka, "Combining Wikis and Screen Capture Videos as a Part of information Systems Science Course" (2010). *AMCIS 2010 Proceedings*. 25.

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Combining Wikis and Screen Capture Videos as a Part of information Systems Science Course

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ABSTRACT

This paper describes the combination of wikis and screen capture videos as a complementary addition to conventional lectures in an information management and information systems development course. Our basis was collaborative problem-based learning with the problems defined by students. The idea was that students were expected to find concepts or issues from our lecture material which are not well-defined or clarified for them. Our intention was that in this way we could run collaborative learning under the principles of the Jigsaw method. In this technique different students create presentations on different themes and the students teach each other by using these presentations.

The students composed a Windows Media Player video focusing on the self-defined problems of a subject area. This was followed by a seminar on our wiki in which the students familiarized themselves with the videos of other students. The approach was beneficial for learning in many ways.

Keywords

Learning of information systems, screen capture video, wiki, web-based learning environment, constructivist learning, connectivism, problem-based learning.

INTRODUCTION

In the constructivist approach learning is comprehended as the development of mental models. Brandt (Brandt, 1997) emphasizes that constructivism is an essential basis when applying the web for teaching and learning. It provides a structure for teaching. By focusing on concepts and connecting them to mental models, teachers can gain both confidence and control over the amount of material they cover in the small blocks of time usually allotted to teaching and training. Integrated with experiences that learners use to alter and strengthen mental models, the constructivist approach to teaching information retrieval also gives users the structure needed to get the most out of the Internet.

The constructivist learning theory presented in this paper is not totally suitable for the era of the web 2.0. In this era learning is more targeted and includes various sources and processes. Connectivism has been suggested as an alternative for current theories (behaviorism, cognitivism, and constructivism) (Siemens, 2004).

The era of the web 2.0 has brought new ways for publishing works on the web (Wikipedia, 2007). The web can be seen an active tool supporting collaboration. One of these new ways is publishing videos. YouTube video service has promoted this significantly. In the spirit of the YouTube students can compose videos by themselves and publish them on the web. In this way they can use video making tools in the spirit of constructivism allowing active learning experiences. One tool for video-making is Windows Media Encoder (WME) which enables capturing screen and voice narration at the same time. These videos are playable in most media players including, for example, Windows Media Player.

Based on the aforementioned we use a problem-based coursework focusing on the problematic concepts of the learning area. First in this coursework, students need to report what these difficult concepts are by familiarizing themselves with a lecture handout. Second, the students need to search content-related information on the web and give some examples of learning. In this way the students can focus on the main concepts and enrich their learning in a constructivist way and the web can help them to learn difficult concepts especially. Based on this acquisition of information students can compose WME videos in which they teach other students to understand these problematic concepts better. The students can utilize this video material at any time and place and in this way WME videos are more useful in education compared to traditional live presentations.

The social constructivist learning theory emphasizes the meaning of interaction in successful learning. For realizing these benefits in our web-supported coursework we suggest the use of a wiki environment (Wetpaint in our case) and its power to share knowledge through single-point access. This occurs by publishing seminar videos, by commenting on seminar videos created by other students (or groups) and by reading comments expressed by other students. By using a wiki environment the students can use their own language to teach each other to understand problematic concepts.

This paper introduces our approach to carry out a web-supported coursework and seminar. Additionally, it provides the analysis of the approach by focusing on the success of our coursework and seminar from the perspective of the goals of the course. To achieve this, we compared the ratings of the students who completed the web-supported coursework to the ratings of the students who did not participate in this coursework.

Our analysis has many goals. We want to know

- how the students' knowledge of different themes was improved,
- how the students experienced the coursework methods, and
- whether age and group size affected the effectiveness of the learning of different themes.

Because of active constructivist learning, we claim that our approach may produce better results in learning compared to traditional teaching and learning. Before discussing the study itself, we first provide an overview of constructivism and the web in learning from the perspective of our study.

CONSTRUCTIVISM

Widely known and discussed views associated with (computer-supported) learning include behaviorism and its opposite, constructivism. Behaviorism is interested in a student's behavior (reactions) in relation to teaching (stimulus) while constructivism is interested in the mental processes which affect the behavior of a student (Risku, 1996). A traditional lecture is mainly based on the behaviorist approach while coursework and projects are typical constructivist learning. Today most web-based instruction is based on behaviorism (Morphew, 2002).

Jonassen (Jonassen, 1994) summarizes what he refers to as "the implications of constructivism for instructional design". The following principles illustrate how knowledge construction can be facilitated by:

- providing multiple representations of reality,
- representing the natural complexity of the real world,
- focusing on knowledge construction, not reproduction,
- presenting authentic tasks (contextualizing rather than abstracting instruction),
- providing real-world, case-based learning environments, rather than pre-determined instructional sequences,
- fostering reflective practice,
- enabling context-and content dependent knowledge construction, and
- supporting collaborative construction of knowledge through social negotiation.

According to Brandt (Brandt, 1997), constructivism asserts that learners construct knowledge by making sense of experiences in terms of what is already known. In constructivist learning the concept of a mental model is essential. Learning is comprehended as the development of a learner's mental models (or a student's knowledge structures). Brandt (Brandt, 1997) emphasizes that constructivism is an essential basis when applying the web for teaching and learning. While the goal of constructivism is to recognize and help to facilitate a learner's ability to construct knowledge when applied to teaching information retrieval on the Internet, it also provides the teacher with a structure for teaching. By focusing on concepts and connecting them to mental models, instructors and teachers can gain both confidence and control over the amount of material they cover in the small blocks of time usually allotted to teaching and training. Integrated with experiences that learners use to alter and strengthen mental models, the constructivist approach to teaching information retrieval also gives users the structure needed to get the most out of the Internet.

The web and its hypermedia nature enable learning by constructing knowledge in the spirit of the cognitive school of constructivism. Cognitive constructivism emphasizes that learning occurs through many channels: reading, listening, exploring and experiencing his or her environment (Piaget, 1977). Furthermore, the web, web-based learning environments, and wikis support learning based on social constructivism by providing different ways of communication. The social constructivist theory emphasizes the influences of cultural and social contexts and interaction in learning (Vygotsky, 1978).

Problem-based learning is one implementation of the constructivist model of learning and the practical implementations of it can vary (Nulden, 1999). By applying problem-based learning to constructivist learning students can concentrate on what is really difficult. According to Ellis et al. (Ellis et al., 1998), in a problem-based learning environment, students work in groups on real-life problems and have the opportunity to determine for themselves what they need to learn in the relevant subject area(s). Based on the aforementioned one approach to problem-based learning can be familiarizing with an area to learn first. This phase can be followed by determining difficult concepts to learn and this could be the basis for an assignment. The assignment can occur on the web using different resources, such as search engines and directories. In this way students can bring fresh and clarifying views for themselves and fellow students in their own language.

THE WEB IN LEARNING IN OUR CONTEXT

Vast information resources are available to teachers and students via the web. However, the problems inherent in any information system such as disorientation, navigation inefficiency and cognitive overload are multiplied on the Internet (Brandt, 1997). On the other hand, these problems can be overcome using a suitable pedagogical approach and/or appropriate tools.

In the case of coursework one approach may be by seeing Internet tools as cognitive tools, in other words, tools for knowledge construction. A cognitive tool is a term introduced by Jonassen in his discussion of hypermedia tools (Jonassen, 1992). He claims that cognitive tools actively engage learners in the creation of knowledge that reflects their comprehension and conception of the information rather than focusing on the presentation of objective knowledge. These tools are learner controlled, not teacher or technology driven. The use of a cognitive tool changes the role of the student into that of an active learner. Figure 1 shows cognitive tools in the general three-dimensional framework for computer-based learning. (Jonassen, 1992). These dimensions are generativity, control, and engagement.

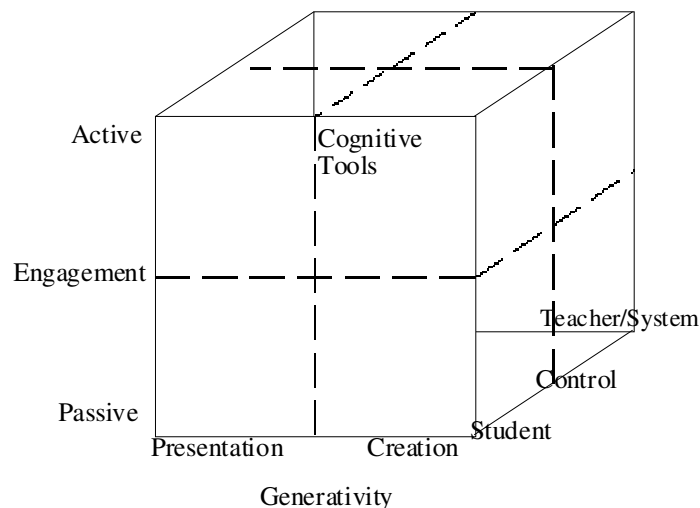


Figure 1. Cognitive tools in the general framework of computer-based learning.

In the same way, web-based tools, like wikis, can be seen in an active context. The students can use wikis for introducing their ideas, receiving feedback, and managing coursework. This leads to learning by constructing knowledge based on both a student's own ideas and other students' ideas.

In the case of a web-based seminar it is useful to discuss the use of the web from the perspective of media research. Haythornthwaite (Haythornthwaite, 2001) stresses the interpersonal ties that affect the character of web-based communication. According to her, strong ties between students improve web-based communication: based on this we claim that traditional teaching and learning are needed as a part of a course. The traditional parts of a course develop these ties in the way that is not possible in a totally virtual training setting. In this way we can create contexts in which effective web-based learning is possible.

Based on the above, it is important to appreciate these views of learning while outlining courses and to understand the use of the web in learning. We stress three following issues. First, we must discuss what the right amount of traditional (behaviorist) teaching should be. Second, we must analyze what the right way to use the web is. Active learning must be promoted and

situations conducive for successful web-based learning must be created. Third, scaffolding support is needed to support constructivist learning based on the web. We claim that after the introductory course level many courses of information systems science can be built on the constructivist approach of learning. Practically, this occurs by organizing a comprehensive coursework that works as the core of a course. This coursework should cover as many course topics as possible. Therefore, we decided to apply the Jigsaw collaborative learning method for our assignment (Aronson, 2010). The Jigsaw method divides area to learn into smaller pieces. In our cases these pieces were four main themes of the course. The students were expected to create a presentation on one selected theme. On the next stage our students were expected to watch videos from three other themes. In this way students can learn whole course content comprehensively.

METHODS

We pursued the study, including a problem-based coursework, and using Windows Media Encoder as well as the use of the Wetpaint wiki platform (see wetpaint.com). In this section we describe our experiment, sample, and results.

Experiment

At the University of Jyväskylä in Finland, the themes of the course Information management and information systems development are (1) administrative view to information resources management, (2) technological view to information resources management, (3) building information systems, and (4) organizational applications. The course was inspired by a textbook, *Information Technology for Management: Transforming Business in the Digital Economy* (Turban et al., 2002). The course usually lasts seven weeks including lectures (36 hours), coursework (feasibility study) as well as the final exam. The course given in the academic year 2008-2009 also lasted for this length of time and included the above-mentioned activities and in addition material and activities on the web to support the lectures in the constructivist fashion combining both cognitive and social constructivism as well as problem-based learning.

To realize the benefit of problem-based learning and constructivism we organized a coursework in which students were expected to learn difficult course themes based on self-defined problems. The students were expected to familiarize themselves with the lecture handout of the course (128 pages) and try to find 5 difficult matters which should be better clarified. Based on these problems they searched for more information from the web to understand the possible difficult matters in our material. The students needed to report what useful links they found by using search engines and directories. They were expected to create Powerpoint slides that included examples of what they have learned. The Powerpoint slides were the basis for videos. Videos were composed by using Windows Media Encoder and they contained Powerpoint slides and narration. The students were expected to clarify to other students what they can learn by seeing examples on the web. This part of the coursework was designed by combining problem-based learning and cognitive constructivist learning theory focusing on the concepts of the content area.

To promote the students' participation in the optional coursework, the students got credits for the final examination by completing the coursework. Although the coursework is a constructivist part of the course, the teacher's office hours were available as an additional resource to promote their work. The students had six and a half weeks for the coursework before the final examination. The work was expected to be conducted as an individual task or in groups of two or three students.

The groups placed the videos on a Wetpaint wiki website. On this workspace students created links to the videos on different servers and in this way Wetpaint enabled the single-point access to all the video material created by the students. Other groups were expected to familiarize themselves with these presentations. Additionally, it was possible to attach comments regarding any work of other groups on this workspace and we used the discussion forums of Wetpaint for this purpose. For making the videos, the groups had six weeks. After these six weeks the groups were expected to comment on three other coursework presentations. These comments were placed in Wetpaint's discussion forum. The students had one week for this. In the comments the students were expected to clarify what they learned by watching other students' videos. This part of the coursework was designed in the spirit of the social constructivist learning theory.

Sample

Thirty-four students, 12 females and 22 males, whose mean age was 24 years (range 18-50 years), participated in the experimental group including the problem-based seminar on the web. 4 students studied informatics as a minor and 30 students as a major. 5 of them completed the coursework individually, and 29 of them groups of two to four students. We call this group the video group in this paper.

Twenty-six additional students, 7 females and 19 males, whose mean age was 25 years (range 19-39 years), were involved in the control group. 7 students studied informatics as a minor and 19 students as a major. We call this group the non-video

group in this paper. The students in the control group completed the course without this assignment including video making and the use of a wiki.

All the students had been initiated into the use of a PC and a web browser, and all of them were familiar with university lecturing. The pre-questionnaire conducted at the beginning of the course showed that the students both in the experimental group and the control group were at the same knowledge level concerning the main topics of the course: (1) administrative view to information resources management, (2) technological view to information resources management, (3) building information systems, and (4) organizational applications.

Collecting data

The data for this study was collected by administering a questionnaire both at the beginning and the end of the course. The respondents rated the personal knowledge level of four main topics with regard to how excellent they considered the knowledge of each topic based on a 5-point Likert (where 1=very poor and 5=very good). Additionally, the respondents rated how beneficial they considered the coursework of the course (where 1=very useless and 5=very useful).

RESULTS

How students' knowledge was improved

Since the data based on the responses of the students concerning the goals of the course did not agree with the normal distribution, the Mann-Whitney test was appropriate for the analysis of the data. Additionally, because of our small sample size we selected this non-parametric test for analyzing the data. Concerning learning of different themes the study found that the problem-based coursework on the web was equally useful in the learning in all the cases. The statistical analysis did not show any significant differences between the groups. However, in all the cases the students of the video group learned the themes of the course slightly better compared to the non-video group. The details of the analysis concerning knowledge are shown in table 1.

	Mean at the beginning of the course			Mean at the end of the course		
	Non-video group	video group	p	Non-video group	video group	p
Administrative view to information resources management	2,46	2,15	.142	3,15	3,23	.551
Technological view to information resources management	2,31	2,09	.309	3,12	3,38	.265
Building information systems	2,43	2,35	.642	3,23	3,35	.422
Organizational applications	2,15	1,91	.250	3,00	2,88	.585

Table 1. Analyzing the students' knowledge of different themes.

If we compare knowledge at the video group at the beginning of the course to the end of the course, the statistical analysis shows that differences were highly significant ($p < .000$) in the learning of all the themes). However, in the non-video group these differences were varying from .001 to .008.

How students experienced coursework in general

Table 2 (see next page) shows the students of the video group ratings on this coursework and seminar in general. The students were expected to rate how they experienced our coursework as a learning method. The result shows that their attitude is mainly positive concerning the coursework generally. The notable point is that no one agreed the meaning of the coursework very insignificant.

n	34
Mean	3.82
Very insignificant	0
Insignificant	1
Moderately significant	8
Significant	21
Very significant	4

Table 2. Meaning of coursework in learning generally.

Evaluating the effect of age and group size

In order to clarify whether age affects the learning of different themes, the Pearson correlation coefficients were calculated. Based on the correlations age does not usually affect significantly the benefit of the web-supported coursework. The result indicates that our assignment suits for the all students regardless of age.

Table 3 shows the details of our analysis in the non-video group and table 4 in the video group.

At the beginning of the course	Administrative view to information resources management	Technological view to information resources management	Building information systems	Organizational applications
Correlation Coefficient	.633	.360	.493	.463
P	<.001	.018	.001	.002
At the end of the course				
Correlation Coefficient	.290	.413	.178	.379
P	.059	.006	.258	.012

Table 3. Analyzing ratings based on age in non-video group.

At the beginning of the course	Administrative view to information resources management	Technological view to information resources management	Building information systems	Organizational applications
Correlation Coefficient	.158	.097	.174	.178
P	.365	.579	.317	.307
At the end of the course				
Correlation Coefficient	.243	-.048	.054	.270
P	.160	.784	.758	.117

Table 4. Analyzing ratings based on age in video group.

By analyzing ratings based on group size we found that group size does not affect the learning of the themes. The Mann-Whitney test did not show significant differences in the ratings between the students who completed the coursework in the group of two students ($n=21$), the students who did the coursework in the group of three students ($n=12$), and the students who completed the coursework individually ($n=10$) both at the beginning and end of the course (p varying from .014 to 1).

DISCUSSION

In this paper we analyzed the effect of our problem-based coursework on the course topics to learn. The results show that a problem-based coursework including a seminar is a potential way to organize a web-based coursework if we have a crowded course. The results are promising because most teachers appreciate the cost-effectiveness of web-based education (Morphew, 2002). Our comparisons show that the wiki-based coursework suits a little bit better for younger students and for students whose knowledge level of the information systems science is lower at the beginning.

Our results show that the students' attitude concerning this wiki-supported coursework was positive. This could be the basis for the next step of our research. As mentioned the constructivist approach of learning is divided into two schools. In our approach the first phase, creating a coursework video, represents the cognitive constructivist approach of learning. In this phase the main focus of learning is concepts. In contrast to this, the second phase, participating in a web-based seminar, represents the social constructivist approach of learning. The key point here is interaction and brainstorming through the web in this phase. Based on this it is fruitful to compare the attitudes of the students concerning the first and second phase of the web-supported coursework. The phases present different sides of constructivism.

The limitation of the study is that we did not compare traditional live presentations to these web videos. However, our approach can reveal many benefits compared to live presentations. The students can access videos as many times as they want. In traditional live presentations the students behave differently. According to Walter et al. (Walter et al., 2004), they can turn visual attention elsewhere (i.e., to static slide or to their notepaper) while maintaining auditory attention on the speaker. Based on these facts we can claim that videos on the web may be the effective way of learning compared to traditional live presentations.

Nevertheless, this paper demonstrates that a successful seminar for a crowded course is possible using Windows Media Encoder and a wiki environment. Windows Media Encoder and related tools bring videos in the active way into the education. Wetpaint or other related tools enable web-based communities. In this way the web brings new possibilities for education and web-based communities are at least as effective as traditional learning settings.

ACKNOWLEDGMENTS

The author likes to thank M. A. Markku J. Suihkonen and Curriculum Expert Shakespeare Vaidya for the help in creating this paper. In addition, he likes to thank lecturer Mikko Jäkälä in encouraging to use Wetpaint as a learning tool and lecturer Tommi Lahtonen, who taught the use of Windows Media Encoder.

REFERENCES

1. Aronson, E. (2010) Jigsaw- the official website, <http://www.jigsaw.org/> (accessed on February 21, 2010).
2. Brandt, D. A. (1997) Constructivism: Teaching for Understanding of the Internet, *Communications of ACM*, 40, 10, 112-117.
3. Ellis, A., Carswell, L., Bernat, A., Deveaux, D., Frison, P., Meisalo V., Maayer, J., Nulden, U., Rugelj, J. and Tarhio, J. (1998) Resources, Tools, and Techniques for Problem Based Learning in Computing, *ACM SIGCSE Bulletin inroads*, 30, 4, 45-60.
4. Haythornthwaite, C. (2001) Tie Strength and the Impact of New Media, in Ralph Sprague (Ed.) *Proceedings of the 34th Hawaii International Conference of Systems Science (HICSS)*, January 3-6, Los Alamitos, CA, USA, IEEE Computer Society Press, CD-ROM.
5. Isaacs, G. (1994) Lecturing Practices and Note-Taking Purposes, *Studies in Higher Education*, 19,2, 203-216.
6. Jonassen, D. H. (1992) What are Cognitive Tools? in P. A. M. Kommers, D. H. Jonassen., J. T. Mayes (Eds.) *Cognitive Tools for Learning*, Springer-Verlag (NATO ASI Series), Berlin.
7. Jonassen, D. H. (1994) Thinking technology, *Educational Technology*, 34, 4, 34-37.
8. Morphew, V. N. (2002) Web-Based Learning and Instruction: A Constructivist Approach, in M. Khosrow-Pour (Ed.) *Web-Based Instructional Learning*, IRM Press, Hershey, PA.

9. Nuldén, U. (1999) PIE- Problem based learning, Interactive multimedia and Experiential learning, in Paul De Bra and John J. Leggett (Eds.) *Proceedings of World Conference on the WWW and Internet (volume 1)*, October 24-30, Charlottesville, VA, USA, Association for the Advancement of Computing in Education (AACE), 816-821.
10. Piaget, J. (1977) *The Development of Thought: Equilibration of Cognitive Structures*, Viking, New York.
11. Risku, P. (1996) A Computer-Based Mathematics Learning Environment in Engineering Education, Report 71, University of Jyväskylä, Department of Mathematics, Jyväskylä.
12. Rosenthal, J. (1995) Active Learning Strategies in Advanced Mathematics Classes, *Studies in Higher Education*, 19, 2, 223-228.
13. Siemens, G. (2004) Connectivism: A Learning Theory for the Digital Age, eLearnSpace <http://www.elearnpace.org> (accessed on May 20, 2008).
14. Sinclair, J. and Coulthard, R. M. (1975) *Towards an Analysis of Discourse: the English Used by Teachers and Pupils* Oxford University Press, London.
15. Turban, E., McLean, E. and Wetherbe J. (2002) *Information technology for management: transforming business in the digital economy*, John Wiley & sons, New York.
16. Walter, D. A., Rosenquist, P. B. and Bawtinheimer, G. (2004) Distance Learning Technologies in the Training of Psychiatry Residents: A Critical Assessment, *Academic Psychiatry*, 28, 1, 60-65.
17. Vygotsky L. S. (1978) *Mind and Society*, Harvard University Press, Cambridge, MA.
18. Wikipedia (2007) Web 2.0, http://en.wikipedia.org/wiki/Web_2.0 (accessed on February 20, 2007).